LIQUID AIR AUTOMOBILE.

Among the novelties displayed this year at the Automobile Show in New York city was an "auto" driven by liquid air. Any doubts that the public may have had as to whether this machine would operate were dispelled by nightly exhibitions upon the track in the center of the main hall, where the automobile, which is herewith illustrated, was run around the track and handled with the same facility as the steam and other automobiles.

There is no reason to doubt the ability of the machine to run; but upon the question of its range of operation, or "radius of action," if we may borrow the term, there is no further information than is contained in the printed literature of the company, which claims that in this particular machine enough liquid can be carried for a continuous journey of 50 miles. It is also claimed that the machine can be operated at a cost per mile which compares favorably with the cheapest forms of power which are used on other types of automobiles. In reply to queries, the operator stated that the Tripler Liquid Air Company would supply liquid air at 15 cents a gallon. As the capacity of the tank is 10 gallons, this would work out at a cost of 3 cents per mile.

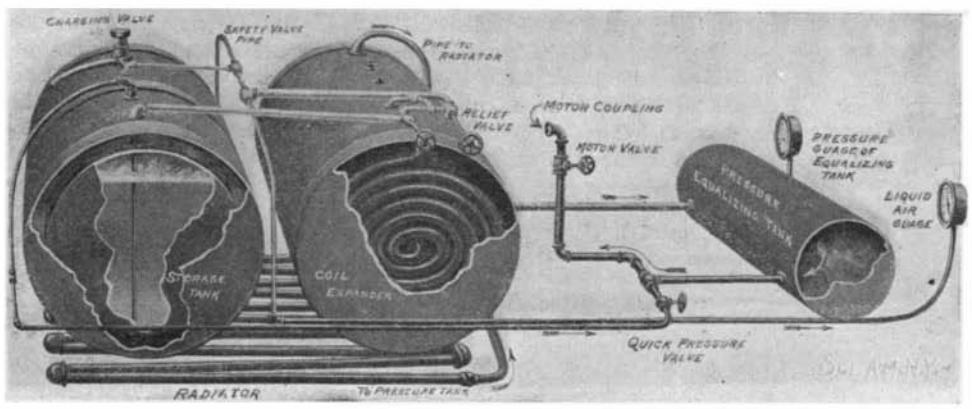
As may be seen from the accompanying illustration, the carriage bears a striking resemblance to the carriages of the steam-driven type, and, in fact, it is neither more nor less than a locomobile, as far as the wheels, frame, body and engines are concerned, the only point of difference being the substitution of liquid air tanks and piping for the gasoline and water tanks and the boiler of the steam-driven machine. Bearing this in mind, the reader will understand that the novelties in the machine are contained in the accompanying perspective view of the liquid air equipment.

Immediately behind the seat, in the body of the car, is carried a copper storage tank for the liquid air. In front of it and beneath the seat is another copper tank, known as the coil expander; while in front of the vehicle, in the position occupied by the gasoline tank in the steam automobile, is another cylinder, known as the pressure equalizing tank. In the carriage illustrated the storage tank and expander are arranged side by side. The storage tank consists of an outer and an inner cylinder with an air space between them which is filled with a non-conducting material. The inner tank is filled with liquid air. Arranged along the top of the outer cylinder are four connections. The first of these (see perspective view) is a feed pipe, which passes through both cylinders and leads to the bottom of the inner cylinder, and is used to draw off the supply of liquid air for evaporation in the coil expander and ultimate use in the engines. The next outlet is a pipe which leads from a coil within the liquid in the inner cylinder to what is known as the quick-pressure valve. The third outlet is a pipe which leads from the top of the liquid air to the safety valve. The fourth connection is an ordinary inlet for charging the tank.

Liquid air, if exposed to the heat of the atmosphere, will evaporate rapidly, and therefore the inner tank has to be carefully insulated. Mr. Tripler claims that the insulation is such that it would take ten hours for the pressure within the tank to reach 100 pounds to the square inch. The normal pressure is maintained by means of a safety valve. The operation is as follows: To start the engine, the feed valve, whose hand-wheel is the rearmost of the two which are seen at the side of the carriage, is opened, admitting the liquid air to a coil of pipe within the expander. Here the liquid is evaporated by the heat of the atmosphere, and after leaving the cylinder, the air passes to what is called the radiator, a set of pipes which are arranged immediately below the two tanks. From the radiator, in which the air is brought up to the temperature of the atmosphere, it passes into a pressure equalizing tank, which, by providing a considerable volume of air, avoids the sudden variations of pressure at the cylinders which might result if the radiator communicated directly with the motor. A pipe leads from the equalizing tank directly to the motor. There are two gages on the dashboard, one of which records the pressure in the liquid air tank, and the other the pressure in the equalizing tank. A quick-pressure valve is provided on a pipe which leads directly from the pressure tank to the coil within the liquid air tank; when this valve is opened, air at normal atmospheric temperature, passing through the coil, produces rapid evaporation of the liquid and a quick rise of pressure.

Immediately in front of the valve controlling the supply of liquid air to the coil expander is a relief valve, by opening which air may be admitted direct from the top of the storage tank to the expander.

LIQUID AIR AUTOMOBILE.



LATEST ARRANGEMENT OF LIQUID AIR TANKS AND CONNECTIONS.

American Rolling Stock for South Africa.

Considerable excitement has been caused in English engineering circles by the announcement that large orders for the supply of new rolling stock for the South African and Transvaal railways, to supplant that destroyed by the Boers, had been placed in this country. A short while ago the various corporations on the Rand requested the military authorities, who are controlling the railways, to replace the rolling stock with the greatest possible expediency. The military Director of Railways replied that if the orders were to be dispatched through official circles, about one year would elapse before the contracts would be fulfilled, and under these circumstances he advised the corporations to place the orders themselves, and to hand it over to the military authorities upon its delivery until military operations had ceased. This course was adopted, and Messrs. Wernher, Beit & Company were intrusted with the placing of the contracts. When the principal English firms were approached, they replied that it was quite impossible for the material to be delivered for several months, since their output was already taxed to the utmost capacity. The American manufacturers were then approached, and they agreed to fulfill the contracts within three months, which was four months quicker than the earliest English promises. Their price was also about one-third cheaper than that of the English manufacturers. Under these circumstances it appears that part of the contract will be undertaken by the English manufacturers, and the remainder, owing to the urgency of the case, has been placed in this country. Some idea of the high pressure at which the English manufactories are working may be had from the fact that one railway company placed an order for 40 locomotives nearly two years ago, and they have not been delivered yet. The Midland Railway Company has just placed an order for 130 locomotives, divided among the four leading locomotive builders in the country. It will be remembered that it was this company which purchased several American locomotives from the Baldwin Works some months ago, but these engines do not appear to have given that complete satisfaction upon the English railways that was anticipated. Another order for railway rolling stock to the extent of $5,000,000 was placed with another prominent firm for immediate delivery.

Bacterial Light.

We are indebted for a good many things to the wondrous synthetic and analytical powers of micro-organisms. Bacteria are being utilized in the arts and manufactures and they promise soon to be the effectual scavengers of the offensive products incidental to the existence of human life, says The Lancet. Indeed, it would seem that the great species of bacteria around us present a variety of functions which doubtless could be turned to many a good account. Bad microbes we know there are, whose subtle operations set up the specific poison of disease, but it would indeed be a very odd circumstance if time should prove that the microbe can be so manipulated as to afford us artificial light. Yet there exists a microbe which when properly fed will grow and multiply enormously, emitting during its development a strange phosphorescent light. In the past we have been wont to look upon phosphorescence as a phenomenon due essentially to the presence of phosphorus somewhere. We now know that this is a mistake, for phosphorescence occurs in a very great number of instances in the entire absence of phosphorus. Phosphorescence is undoubtedly a manifestation of chemical or physical change, but the change of course may not always be due to the working of countless microscopic organisms. It certainly is in the case of the phosphorescence of the sea. In this case the phosphorescence is best when the sea is disturbed, and the maximum of light is emitted from the crest of a short, rapid wave or in the foam produced by some disturbance. This is due to the fact that the phosphorescent bacteria or photo-bacteria are much more active in the presence of an excess of oxygen. Indeed, the respiratory exchange or oxidation of the bacteria is the cause of sea phosphorescence, since if the micro-organisms be killed or oxygen be excluded the light is quenched at once, while on adding an abundant supply of combustible food-stuff such as sugar, the light is intensified. The glow of ordinary yellow phosphorus is, of course, due to direct oxidation without the agency of micro-organisms. The peculiar greenish glow seen upon stale haddocks and other sea fishes is produced by this remarkable photobacterium, and is in no way connected with the presence of phosphorus. It is possible to cultivate the phosphorescent bacteria so as to obtain a fluid which is very strongly phosphorescent. Thus by placing the flesh of fresh haddocks or herrings in a two to three per cent solution of common salt and keeping at a low temperature—about seven degrees above freezing—it will be found that after a few days not merely the fishes, but also the whole of the liquid in which they are immersed, give off a pale greenish light which becomes much more brilliant if a little sugar be added. Pure cultures may thus be obtained exhibiting such a strongly phosphorescent light that by protracted exposure they may be photographed by their own light. It is not possible to say whether the culture will ever be carried to such a pitch that the vessel containing it may be used with advantage as a street lamp or a lamp upon our tables or a Chinese lantern at our garden parties. But the wonderful functions of bacteria are many, and the possibilities of using their powers multifarious.

A New Electric Fountain.

A new electric fountain has been devised. The idea is to combine tableaux-vivants with a display of brilliantly illuminated pouring water. A fountain of this kind has been built at Heine Park, Kansas City. In the center there is a platform for persons who are to impersonate various statues and groups. Outside of this circular platform are jets which are illuminated by electric lights. The space in the center being dry, pyrotechnic display will be used in conjunction with the aquatic figures.